

## **Prediction of potential outburst floods from a glacial lake due to moraine dam failure**

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**Abstract** Flood and sediment disasters are frequently caused by outbursts from glacial lakes in the Himalayas of South Asia and other glacier regions of the world. The resulting floods from the glacial lake outburst can cause catastrophic flooding in downstream areas, with serious damage to lives and property. Therefore, there is a pressing need to investigate the outburst of potentially dangerous glacial lakes. In this study, a numerical model was developed to compute the characteristics of glacial lake outburst due to moraine dam failure by seepage and water overtopping. To compute the pore-water pressure in the dam and slope stability of the dam, a seepage model and a slope stability model were incorporated into a numerical model of flow and dam surface erosion. The numerical model was verified with experimental results. The simulated results of the outburst discharge, variations of moisture inside the dam and failure surface of the dam were consistent with experimental results. Using the developed numerical model, the potential outburst floods from Tsho Rolpa Glacial Lake in the Himalaya of Nepal were predicted with various multi-scenarios.

**Key words** glacial lake outburst; numerical model; Tsho Rolpa glacial lake; potential flood; prediction